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SLASH-DISPOSAL METHODS IN LOGGING SHORTLEAF PINE

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* - This series of publications releases data gathered in connection with investigations being carried on at the Southern Station. The information contained in them is subject to correction or amplification following further investigation. - Editor

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Introduction

The Forest Conservation Code and Rules of Forest Practice,¹ adopted by the Southern Pine Division of the Lumber Code Authority, states that "no slash or brush disposal shall be required other than to remove tops and brush from the seed trees left in the logging operation" except "in cases of extreme fire hazard." At such times, the "disposal of dangerous slash and logging and milling debris adjacent to camps, mills, and logging railroads may be prescribed in a manner and at a time most favorable to the protection of the area and adjacent areas."

It is evident from the above that slash disposal is not ordinarily considered a serious problem in the Southern Pine Region. This conclusion has been reached as the result both of general observation and the analysis of specific studies or investigations. This paper presents a brief summary of an investigation of the rate of decay of shortleaf pine logging slash on the Ouachita National Forest in Polk County, Arkansas. The study was conducted by the Bureau of Plant Industry in cooperation with the Southern Forest Experiment Station and the Ouachita National Forest.

The study and its results

The site of the study was a steep hillside (20 to 40 percent slope) with a southeast to southwest exposure. Before logging, in October, 1929, the forest consisted of virgin shortleaf pine, intermixed with occasional, and much smaller, black, red, and white oaks and black gum. The shortleaf was cut into logs to a top diameter of 6 to 8 inches. Several shortleaf seed trees and all the hardwoods (which were unmerchantable) were left.

The principal purpose of the study, started immediately after the logging, was to compare and evaluate different method of slash disposal by determining the rate of decay and disintegration of the shortleaf logging slash when (1) piled in tepees (a method commonly used for brush disposal on western national forests), (2) lopped and scattered, and (3) left intact as it fell. These three treatments were used on three sample areas, and on another area (4) the slash was piled and burned.

¹ In compliance with Article X of the Lumber Code, effective June 1, 1934. Incorporated under Schedule C of the Code of Fair Competition for the Lumber and Timber Products Industries.

In each case the plots were $\frac{1}{4}$ -acre in area. A secondary object was to determine the species of fungi that were most instrumental in the process of slash decay.

The study areas were examined in March, 1931, and again in April, 1933, or 16 and 42 months, respectively, after establishment in October, 1929. The results may be briefly summarized as follows:

SIXTEEN MONTHS AFTER LOGGING, on the three areas where the slash was not burned, from 40 to 50 percent of the needles were still attached to the twigs. The twigs were slightly decayed, breaking off up to $\frac{1}{4}$ -inch in diameter. The bark was intact and firm. Much of the sapwood was blue-stained where beetles had entered the wood. Decay was apparently somewhat slower in the piled slash than in the lopped-and-scattered or untreated slash. The amount of combustible material was practically the same as when the study was established, immediately after the logging.

FORTY-TWO MONTHS AFTER LOGGING, however, great changes were apparent.

The following notes were made:

SLASH PILED IN TEPEES: The extent of decay was obviously less than that under the other treatments. The greatest amount of decayed wood was found in a 6-inch zone just above the ground. Here, branches up to 1 inch in diameter could easily be broken. No fungus fruiting bodies were found. The wood on the inside of the piles was sound. Ten to fifteen percent of the area otherwise suitable for establishment of seedlings was occupied by the piles.

SLASH LOPPED AND SCATTERED: All needles had fallen. Practically all of the sapwood and part of the heartwood had decayed. Branches up to 2 inches in diameter broke easily. The bark was persistent but loose. Fruiting bodies of two species of fungi were abundant.

SLASH LEFT INTACT: All needles save a few very close to the ground had fallen. Practically all of the sapwood and part of the heartwood had decayed. Branches up to $2\frac{1}{2}$ inches in diameter broke easily. Fruiting bodies of fungi were common.

SLASH PILED AND BURNED: This treatment eliminated decay as a factor in slash disposal, and also the fire hazard. Branches were charred to a depth of about $\frac{1}{4}$ -inch. No fungi were found on the charred wood. Burning of brush had affected the thin soil unfavorably, so that nothing had been able to grow on the former sites of the piles.

Only two species of fungi were important factors in the process of decay. These were *Lenzites saepiaria* (Wulf.) Fr. and *Polystictus abietinus* (Dicks.) Fr. These fungi caused at least 70 percent of the observed decay. The former attacked both heartwood and sapwood, especially in the smaller branches. The latter, which caused the greater amount of decay, attacked only the sapwood but was common on logs as well as branches. Other fungi, of much less importance, were *Merulius ambiguus* B. and *Poria* sp.

Discussion of results

Slash disposal is a factor that has an important bearing on both fire hazard and the natural regeneration of forest stands following logging. There would be no thought of any "disposal" of slash--it would merely be left where it fell, as a matter of course--were it not for the effect it may have, and often does have, on fire hazard and natural regeneration. Costs must also be considered. Viewed from these angles, the study brought out the following points:

1. - The piling of slash, without later burning, has very serious disadvantages. The rate of decay is greatly retarded, the procedure is expensive, and in the present study the piles occupied 10 to 15 percent of the area otherwise suitable for the establishment of pine seedlings.
2. - Lopping and scattering slash neither retards nor accelerates decay; it is much more expensive than merely pulling tops away from valuable standing trees.
3. - Piling and burning slash is expensive, averaging perhaps twice the cost of lopping and scattering. Its advantage of immediate elimination of the fire hazard is counterbalanced by its disadvantage of creating such unfavorable soil conditions beneath the piles that seedling establishment is greatly delayed.
4. - When slash is left intact, the tops are allowed to remain where they fall. Under these conditions, some fire hazard persists up to the third or fourth year after logging. Most of the sapwood has decayed by this time, but during periods of very dry weather the slash may again become inflammable. Where tops are left within about 20 feet of valuable advance growth or less than about 10 or 15 feet from isolated seed trees, a considerable fire hazard will exist during very dry periods even through the fourth season after logging. However, much of this hazard can be eliminated at the time of logging, and at little extra cost, by pulling or dragging such tops away from the trees that they endanger. On dry sites, the decay of slash left intact or merely pulled away from standing trees is essentially as rapid as that of slash lopped and scattered.

Summary

The study reported in this paper, when viewed from the angles of fire hazard, natural regeneration, and cost, indicates that for the given forest type and conditions the best procedure is the simplest. The best disposal practice, paradoxically, is no disposal at all--simply to leave the tops where they fall. In practice, slight modifications should be made. No tops should be left lodged in or propped against standing trees, and tops should be dragged far enough away from seed trees or valuable advance growth to reduce or eliminate the danger of a slash fire killing or seriously weakening or damaging such trees. This is a sensible, relatively inexpensive precaution, and it precludes the necessity of more costly methods of disposal.



Slash piled in tepees. October, 1929



Same subject as above. The smaller brush left on the ground at time of logging was nearly all decayed. April 18, 1933



Part of a tree top where the slash was left intact, illustrating the complete decay of sapwood by the forty-second month after logging. April 18, 1933



Site of a rick-pile after slash was burned. Center of burned area is still barren about three years after the fire. April 18, 1933